

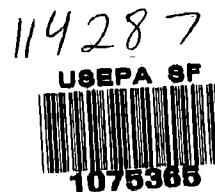
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From: <Kiehn.Orville@epamail.epa.gov>
To: R10SEA1.RODENALI (VOYTILLA-MARYKAY)
Date: 3/17/99 9:26am
Subject: Bunker Hill AMD Treatment Sggestions

Results of a library search on the possible application of reverse osmosis technology at the Bunker Hill Mine site water treatment faciliity attached

(See attached file: BuHill03.169.wpd).

CC: RTPMAINHUB.INTERNET (RUSSELL-CAROL, DUNN-JAMES)



File: BuHill03.169

Date: March 16, 1999

To: Mary Kay Voitella

From: Orville Kiehn
EPA Region 8

Subject: Draft Presumptive Remedy-AMD Treatment, 3.0 Technology Screening, Section 3.1 Initial Screening Rejection of Water Treatment Using Reverse Osmosis

Rock Creek, MT

In the process of assisting you in EPA Region 10's evaluation of the application of metal leaching/acid rock drainage (ML/ARD) process technology to the Bunker Hill Mine site, I am also mindful of somewhat similar proposals in other EPA Regions including Region 8 and possibly Region 4. In Region 8 at the proposed Rock Creek, MT ASARCO mine site, the drainage of which may possibly reach the border of the State of Idaho and Region 10, the use of the membrane process reverse osmosis (RO) treatment technology is proposed.

In the 3rd internal draft FEIS, January 1999, ASARCO proposes to treat mine water discharge with a process train including (worst case if the mine water contains problem heavy metals) clarifier-media filters-ABC trickling filter-ABC cells-aeration-media filters-RO-aeration. ABC=anoxic biotreatment cells for nitrogen compound removal (blasting residue).

Bunker Hill, ID

In the Bunker Hill site technology screening section on page 12 of the discussion in AMD Treatment, RO is advised to be rejected because of "Greater risk due to high potential for membrane fouling, comparable to evaporation in effluent quality".

If (1) the evaporation process alone meets the draft TMDL requirement and (2) RO is equal in performance to evaporation and (3) micro-filtration is said to have the "potential to achieve consistent metals reduction", why wasn't the series design of one of the Table 6 initial processes (Precipitation, Reduction, Complexation) + micro-filtration + RO considered to meet the draft TMDL requirement?

Reference Engineering News Record September 21, 1999 cover article "Microfiltration Runs Wide Open". The reference states that San Diego, CA is planning to build a 20,000,000 gallons/day waste water reclamation facility based on six years of testing membranes upstream of reverse osmosis filters to reclaim municipal wastewater to recharge aquifers.

At Scottsdale, AZ , the Scottsdale Water Campus Project schematic in the same 9/21/98 ENR

article on pg 37 shows a complete flow diagram. The project designer, Brad Hemken of Black & Veatch, Kansas City, advises "We'll reclaim 12 mgpd of wastewater through a conventional treatment plant and use it for irrigation on golf courses...another 10,000,000 gallons/day will run through advanced treatment, microfiltration and reverse osmosis, to bring the product to drinking water standards for re-injection into the vadose zone (see. diagram)".

Giving additional credibility to CH2MHill's (HILL) concerns about RO at Bunker Hill, The results of this literature review indicate that the reason HILL advised rejecting RO technology (membrane fouling) was also enough of a concern in San Diego to cause that municipality to test membranes upstream of RO for SIX YEARS! However, based on significant extensive membrane-RO test results, there now appears to be much less technical concern about how to operate and maintain a RO system. More recently the San Diego municipality and others mentioned in the ENR article have reportedly embraced RO technology and are building municipal water treatment systems with potentially more complex loads (metals, organics, inorganics, etc.) and for several times the capacity than that at the Bunker Hill Mine.

Suggested is communication with HILL to better understand (1) the specific technical reasons supporting the rejection of RO and, (2) whether or not the San Diego or Scottsdale water treatment plant designs that included (at least at Scottsdale) a series conventional treatment (similar to the Bunker Hill upgraded HDS) + micro-filtration (or ultra-filtration) + reverse osmosis would be workable at the Bunker Hill CTP.

The capital cost at Bunker Hill could be an Alternative 2 + RO UNLESS the Bunker Hill upgraded HDS facility front-end could then be eliminated, possibly resulting in a lower capital and operating cost treatment train (no front-end chemicals or chemical mixing) of say filtration (media filtration + micro-filtration + ultra-filtration?) + RO + pH adjustment with discharge to the river. The RO residual brine, per the Rock Creek Figure 2-36, is stored in a pond and then campaigned through a crystallizer. The crystallizer solids are shown to be shipped off site in drums.

Please advise if I should Fax the ENR article and the Rock Creek flow sheet (I would need your Fax number).